

**NURSES' KNOWLEDGE AND PRACTICE IN THE APPLICATION
OF THE GLASGOW COMA SCALE IN THE INTENSIVE CARE
UNITS AND EMERGENCY DEPARTMENT AT MUHIMBILI
NATIONAL HOSPITAL AND MUHIMBILI ORTHOPAEDIC
INSTITUTE, IN DAR ES SALAAM.**

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**MSc. Nursing (Critical Care and Trauma) Dissertation
Muhimbili University of Health and Allied Sciences.
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Muhimbili University of Health and Allied Sciences

Department of Nursing



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By

Jacqueline Joseph Kimboka

**A Dissertation submitted in (Partial) Fulfillment of the Requirement for the Degree
of Masters of Nursing (Critical Care and Trauma) of**

**Muhimbili University of Health and Allied Sciences
October, 2017**

CERTIFICATION

The undersigned certify that she has read and hereby recommend for acceptance by the Muhimbili University of Health and Allied Sciences a dissertation entitled: *“Nurses’ knowledge and practice in the application of the Glasgow Coma Scale in the Intensive care units and Emergency department at Muhimbili National Hospital and Muhimbili Orthopaedic Institute, in Dar es Salaam”*, in (partial) fulfillment of the requirement for the degree of Master of Science in Nursing (Critical Care and Trauma) of Muhimbili University of Health and Allied Sciences.

Dr. Anne H.Outwater
(Supervisor)

Date: _____

DECLARATION AND COPYRIGHT

I, **Jacqueline J. Kimboka** declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

Signature.....

Date

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MAY THE ALMIGHTY GOD BLESS YOU ALL!

DEDICATION

This work is dedicated to my lovely first lady/daughter Rachel Comfort Roman and my son Reverian Peace Roman for tolerating my absence when I was late at home from studies and my beloved husband Mr. Roman Peter for his full support, understanding and tolerance of my busy academic schedule during the whole course of my master's studies. This dissertation is also dedicated to my late parent; my father Joseph Thomas Kimboka and my living mother Ms. Bibiana Joseph Kitutu whom through their good care and support during their lives, gave me a good education foundation that has brought me to this level.

ABSTRACT

Background: Neurological observations comprise of a combination of indicators and are performed on patients who may be at risk of neurological deterioration. The Glasgow Coma Scale (GCS), first presented by Teasdale and Jennet in 1974, is one of the most effective and reliable tools to assess the depth and duration of impaired consciousness, especially for the patient with head injuries. It can be used by nurses as an indicator when there is a need for intervention or treatment in emergency conditions.

Aim: To assess the knowledge, practice and identify the factors associated with assessment of the GCS among nurses working at Muhimbili National Hospital and Muhimbili Orthopedic Institute, Dar es Salaam.

Methods: A quantitative cross-sectional design was used, where by a structured questionnaire assessed 158 nurses about their knowledge and the factors associated with utilizing the GCS, and a checklist was used for observation of practice. Nurses working in EMD and ICU were conveniently recruited. Data was analyzed using SPSS computer software version 21.

Results: More than half (55.1%) were aged between 25 to 34 years. Many of them (69.6%) were females. Of the participants 62.7% had a diploma in general nursing and only 4 (2.5%) had a Master's degree and above. Only 13.3% of participants had high level of knowledge regarding GCS. More than half the nurses did not know the lowest score. Around half (47.6%) of nurses had never attended any type of training. Several factors were reported to deprive assessment using GCS such as lack of knowledge about application of GCS (19.6%), work overload of nurses (19.6%), lack of resources (14.6%), lack of skills (5.7%) and lack of training (5.1%).

Conclusion: Nurses have a low level of knowledge about the GCS assessment. More than half the nurses did not know the lowest score for the GCS. They could not identify

which GCS score indicated a patient was in a critical neurological condition. There was a large discrepancy between the knowledge scores and the nurses' perception about their current knowledge. There was less understanding of the neurological bases, and clinical application of the GCS, with lack of continuing educational updates on the GCS. The inadequate knowledge possibly will limit their capacity for clinical judgment and decision making in managing unconscious or deteriorating patients.

Recommendation: There is need to implement a continuous professional education program on GCS assessment with special focus on methods of assessment, guidelines, how to use assessment tools, protocols and proper documentation for critically ill patients.

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ABBREVIATIONS

BEO	Best eye opening
BMR	Best motor response
BVR	Best verbal response
CNS	Central nervous system
EMD	Emergency Medicine Department
E	Eye opening
ES	Emergency services
GCS	Glasgow Coma Scale
ICU	Intensive Care Unit
MNH	Muhimbili National Hospital
MoHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children
MOI	Muhimbili Orthopaedic Institute
M	Motor response
MUHAS	Muhimbili University of Health and Allied Sciences
SPSS	Statistical Packages for Social Sciences
TBI	Traumatic brain injury
TNMC	Tanzania Nurses and Midwives Council
V	Verbal response

DEFINITION OF TERMS

Glasgow Coma Scale – Is a neurological scale which gives a reliable, objective way of recording the conscious state of a person, for initial as well as subsequent assessment. It consists of three components (eye opening, best verbal response, and best motor response) (Al-Quraan& Aburuz, 2016).

Critically ill patient: Is any person suffering with a disease process or an injury, which causes physiological instability leading to disability or death within minutes or hours (Frost, P., & Wise, M. P, 2007).

Consciousness:A state of general awareness of oneself and the environment and includes the ability to be orientated to time, place and person. It is a dynamic state that is subject to change (Hamza, 2015).

OPERATIONAL DEFINITION

Knowledge: Is the theoretical understanding of the nurse about the key principles related to Glasgow Coma Scale assessment among critically ill patients.

Practice: Is the performance of interventions based on principles related to GCS assessment and scoring system among critically patients.

Registered Nurse:A nurse who has acquired a diploma, or advanced diploma in nursing, a Bachelor degree, or a Master's of Science in Nursing, and is exposed to all medical and surgical nursing, pediatric nursing, midwifery, leadership, research and also passed a state board examination and been registered and licensed to practice nursing (TNMC, 2005).

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CHAPTER ONE

1.0 INTRODUCTION AND BACKGROUND:

The Glasgow Coma Scale (GCS), first presented by Teasdale and Jennet in 1974, is one of the most effective and reliable tools to assess the depth and duration of impaired consciousness, especially for the patient with head injuries. According to a study done in Vietnam by Nguyen, (2011) on the accuracy of the Glasgow Coma Scale on critically ill patients, 'the assessment not only identifies the neurological problem but also detects the initial signs of complications'. It can be an indicator of the need for intervention or treatment in emergency conditions (Thi & Chae, 2011). In a study conducted by Stern and Scale on observing and recording neurological dysfunction she identified that, GCS enables practitioners to assess consciousness in adults regularly and quickly, and to determine trends that can be easily interpreted and explained to other team members (Stern & Scale, 2011).

Neurological observations comprise of a combination of indicators and are performed on patients who may be at risk of neurological deterioration. The main purpose for recording the observations are to determine a baseline, to identify changes and to promptly detect life threatening situations. The GCS is an assessment of the level of consciousness measuring three indicators which include: eye opening, best verbal response, and best motor response. Other components and essential parameters; pupil reaction, vital signs, limb movements and strength define the basic general neurological condition of the patient and when monitored regularly, allow changes to be detected early (Chan Moon Fai, Mattar Ihsan, 2013).

Each indicator of the GCS, has a scoring system that is used when assessing the patient. These scores are added together to achieve a total score for level of consciousness, which forms part of a broader neurological assessment. The highest GCS score is 15, which indicates full responsiveness and ability to orientate, while the lowest score is 3, which indicates complete unresponsiveness and unconsciousness (Stern & Scale, 2011).

Glasgow Coma Scale

Best eye response (E)	Spontaneous – open with blinking at baseline	4
	Opens to verbal command, speech, or shout	3
	Opens to pain, not applied to face	2
	None	1
Best verbal response (V)	Oriented	5
	Confused conversation, but able to answer questions	4
	Inappropriate responses, words discernible	3
	Incomprehensible speech	2
	None	1
Best motor response (M)	Obeys commands for movement	6
	Purposeful movement to painful stimulus	5
	Withdraws from pain	4
	Abnormal (spastic) flexion, decorticate posture	3
	Extensor (rigid) response, <u>decerebrate posture</u>	2
	None	1

Table 1: Table of the Glasgow Coma Scale

A study conducted in a British hospital concerning the Glasgow Coma Scale – a brief review past, present, future explains that: In best eye response, scores of 3 and 4 imply that the cerebral cortex is processing information, even though this is also seen in the vegetative state, while a score of 2 shows that lower levels of brain are functioning. In best verbal response, presence of speech indicates a high degree of integration in the nervous system even though lack of speech could be attributed to other factors (for example, dysphasia or tracheostomy). While in the best motor response a score of 3 implies that the lesion is located in the internal capsule or cerebral hemispheres and is attributed to disinhibition by removal of corticospinal pathways above the midbrain. The motor response is considered a good indicator of the ability of central nervous system (CNS) to function properly due to the variety of possible motion patterns’ (Matis & Birbilis, 2008)

Another study conducted in Belgium on the lack of standardization in the use of the Glasgow Coma Scale, showed that nurses assessment of the level of consciousness in traumatic brain injured patients varied greatly. Similar GCS results from the same patient were not reproduced by all nurses assessing that one patient (Brennan et al., 2016). The views expressed affirm the continuing influence of the GCS in daily nursing practice and decision making. However, the findings also confirm a substantial lack of standardization in its use. The GCS was developed to promote clear, consistent communication of the level of consciousness of patients suspected to have recently sustained any kind of injury or insult to the brain. The view of many responders that the GCS is important in serial evaluation of individual patients, confirms the initial justifications for development of the GCS. Reliability is then of paramount importance, given that discrepancies in approach could cause differing results, miscommunication among caregivers and consequently result in suboptimal management (Brennan et al., 2016).

The present criterion standard for assessing a patients altered conscious state in Australasian Emergency Departments, Intensive Care Units and the pre hospital context, is the Glasgow Coma Scale (GCS). Accurate assessment of the severity of coma depends on five clinical parameters that need to be tested to classify the degree of injury (Pulm and Posner, 2007): state of consciousness, brainstem function and breathing patterns, pupillary size and reactivity to light, eye movements and ocular reflexes, and motor responses. More importantly, intubation can influence the final score because the verbal component cannot be tested and there are inconsistencies in how different trauma centers document this feature leading to a reduction in validity (Kevric, 2010).

The level of consciousness should be the first thing assessed during a neurological examination because the information obtained can be used to influence the remainder of the examination if necessary. The GCS is based on simple and clearly defined parameters of patient responses that provide consistent assessment data. It is used to

determine the potential for rapid deterioration in consciousness. The Glasgow Coma Scale is the most commonly used neurological assessment in clinical care, if the patient is in coma (Jaddoua, Mohammed, & Abbas, 2013).

Since it was developed, the GCS has been used world-wide because it enhances communication among health care practitioners through a common reporting language, despite its simple appearance. Because of the apparent simplicity of GCS, a lot of health care practitioners have used it in an inappropriate way without carefully referring to the GCS instructions. Previous studies reported a variety of health care providers used GCS inaccurately and ineffectively in their clinical practice (Thi & Chae, 2011).

There are a few factors that affect accuracy of GCS scoring. Nguyen, (2011) in a study conducted with Vietnamese nurses compared GCS scorings among nurses working in different units. They reported that the nurses with specific qualifications from critical care training performed GCS accurately. The unstable condition of patients and inadequate GCS knowledge and experience of physicians and nurses had an effect on the accuracy of GCS scoring. These findings indicate the positive relationship of GCS knowledge with accurate GCS scoring (Thi & Chae, 2011). Because inaccurate performance of GCS scoring may lead to care that subsequently leads to deterioration of a patient's outcome, it is crucial to ensure complete and accurate practice of the GCS.

Consistent assessment and communication of the GCS at different times and between different observers is essential in patient care and depends on standardization to determine each of the three components of the scale: eye, motor, and verbal responses. Reith, (2016) in her study done in Belgium on the lack of standardization in the use of the Glasgow Coma Scale, stated that: the assessment of each component requires observation of either a spontaneous activity, or of the response after application of a stimulus. Full reporting of each of the three components of the GCS was advised for assessment in individual patients. The use of its derived sum score is more appropriate for classification and prognosis (Brennan, Maas, Reith, & Teasdale, 2016).

Therefore assessing application of knowledge and practice by using the Glasgow Coma Scale for critically ill patients is important; a gap between knowledge and practice will be used for the basis of a training program on the proper use of GCS.

1.1 Problem Statement

The Glasgow Coma Scale is the best measure of the overall brain dysfunction caused by traumatic brain injuries (Teasdale, 2005). There is a need for nurses to accurately assess a patient's conscious level to detect neurological changes and initiate prompt action. Knowledge of nurses in assessing patients using the GCS seems to be inadequate and this is evidenced by a study done by (Jaddoua et al. 2013) in Iraq on "Assessment of Nurse's Knowledge Concerning Glasgow Coma Scale in Neuro - Surgical Wards ", which revealed that; all nurses' knowledge was inadequate concerning the application of the Glasgow Coma Scale.

The number of patients who sustain a traumatic brain injury (TBI) in Africa is high and all those patients need empirical assessment of the GCS that will help to determine the severity of their injury. This is evidenced by a study done in Nigeria on nurses' knowledge of the GCS in neurological assessment of patients in a selected tertiary hospital which reported that a total of 9, 444 traumatic brain injury patients were attended to in 24 months, which translated to a presentation rate of 5.3 cases per week (Ehwarieme & Anarado, 2016). In Tanzania, no studies have been published that assess the knowledge of the nurses on the performance of GCS. However statistics collected from MOI between January and June 2017 shows that 758 patients presented with a TBI. This large number of patients, from only one hospital required accurate and regular GCS assessment and documentation to detect any neurological changes.

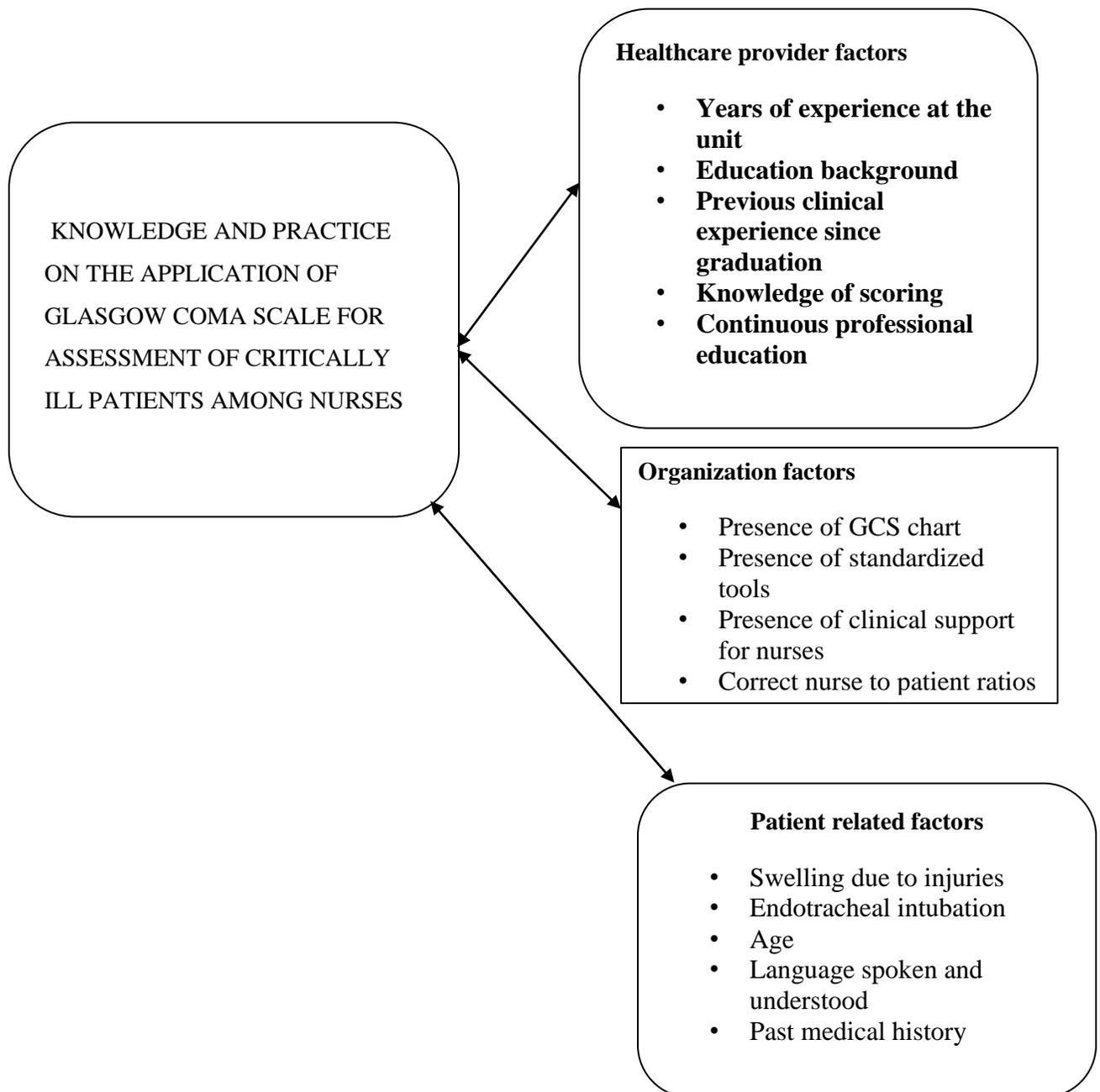
It is essential for a nurse to have knowledge and skills about neurological assessment and the GCS so, changes in the level of consciousness can be identified early and interventions can be provided promptly, resulting in improved patient outcomes. A higher level of knowledge promotes accuracy when performing GCS scoring. Rapid and

correct assessment will minimize the neurological complications, unnecessary and incorrect diagnostic procedures, mortality and morbidity. Correct practice may not be implemented due to factors such as a lack of knowledge of nurses about how to use/score the patient by using GCS and that would affect the accuracy of GCS scoring (Thi, Hien & Chae 2011).

Through the researcher's personal observation and experience, nurses' caring for the critically ill patients at the hospital usually use the initial GCS done immediately at the emergency department by doctors as the patient's baseline. And, when patients are admitted in the ward or ICU, nurses do not assess patient's conscious state themselves, but still rely on the doctor's assessment of the Glasgow Coma Scale (Kisakeni, 2015). Nurses fail to assess patients' by using GCS, which is available in the observation chart, to detect the severity of brain injury of the patients admitted in EMD/ICU. Therefore, this study is intended to assess and describe the existing knowledge gap. The findings from this study will be used to create recommendations that bridge the gap between knowledge and practice, and ensure nurses are accurately assessing the neurological status of critically ill patients.

1.2 CONCEPTUAL FRAMEWORK

Figure 1: Conceptual frame work developed from the literature reviewed



This study intends to record the application of knowledge and practice of nurses by using GCS for assessment of critically ill patients. The researcher developed the framework using the literature accessed from Chan Moon Fai, Mattar Ihsan, (2013). In this framework, the application of the Glasgow Coma Scale is affected by the health care provider; patient related; and organizational factors. These factors are independent variables and all influence the nurses' ability to correctly assess a patient by using the GCS. They must all be taken into account when trying to understand nurses' knowledge and practice, which is the dependent variable of this study.

Nurses need education, clinical experience and clinical observation of their practice, to ensure they are able to translate knowledge into practice. They need support from their organization with charts, tools, appropriate workload and continuing education support to nurture and grow their skills. Nurses also need to understand that different patient factors will affect their assessment and ensure they consider them when utilizing the GCS.

The investigator will concentrate on health care provider factors. When these factors negatively affect assessment of the GCS, there will be poor scoring leading to unmet nursing care. On the other hand, when these factors positively affect performance of GCS, there will be correct scoring of patients (proper application of GCS).

The conceptual model will be used for broadening understanding of the application of GCS in the study area and formulating the research tools to capture information which responds to the key research questions of the study.

1.3 Significance/Rationale of the Study

This study aimed to determine the extent of knowledge, practice and the factors associated with following the application of Glasgow Coma Scale among nurses. As mentioned, the nurse's knowledge of the GCS and its application has implications on direct care to patients, because if deteriorations in condition are identified early, interventions can be applied to minimize further brain injury. This study wanted to examine whether nurses were indeed assessing their patients' GCS correctly and therefore providing the best standard of care to critically ill patients.

The researcher believes the nurses are relying on the doctors assessment of a patients GCS, as nurses do not have the knowledge or the skills to accurately assess patients themselves. These compromises the care provided to the patients.

The findings will provide guidelines for in-service training for nurses and recommend that nursing training programs review their curricula and ensure teaching about neurological assessment is thorough and comprehensive. Nurse Managers within hospitals, will be encouraged to provide clinical supervision to their nursing staff to ensure nurses are able to translate their knowledge into safe and accurate practice. Once the policy makers are aware of the findings, they can implement a guideline for nurses, to ensure they will utilize the GCS regularly and appropriately to assess their patients.

1.4 Research questions

- i. What is the nurses' level of knowledge when using GCS?
- ii. What are the nurses' practices in scoring critically ill patients by using GCS?
- iii. What are the factors that inhibit nurses to correctly follow GCS application?

OBJECTIVES

1.5 Broad Objective

To determine the knowledge, practice and factors which inhibit nurses in the application of the GCS to assess critically ill patients in the Intensive Care Unit and Emergency Medical Department at Muhimbili National Hospital and Muhimbili Orthopedic Institute, Dar es Salaam.

1.5.1 Specific objectives

The specific objectives of this study will be:

- i. To determine nurses' level of knowledge on using GCS
- ii. To determine the nurses' practice on scoring critically ill patients by using GCS
- iii. To determine the factors that inhibits nurses correctly assessing the GCS of patients.

CHAPTER TWO:

2.0 LITERATURE REVIEW

A literature review is a written summary of the state of existing knowledge on a research problem or organization of ideas that when brought together they will help to guide a researcher on how to do a study (Polit Denise F. Beck Cheryl 2012). This review will be guided by the specific objectives of the study. The primary concepts are presented in the following section.

2.1 Nurses' level of knowledge on using GCS

A proper neurological assessment using the Glasgow Coma Scale is an essential part of nursing care. It is essential for the nurse to have knowledge and skills about neurological assessment and the Glasgow Coma Scale. In a study conducted by Stern and Scale on observing and recording neurological dysfunction they identified that, GCS enables practitioners to assess consciousness in adults regularly and quickly, and to determine trends that can be easily interpreted and explained to other team members (Stern & Scale, 2011). Findings revealed by a study (Marian Teles, Bhupali Preeti, 2013) done in India on the effectiveness of a self-instructional module on knowledge and skills regarding use of the Glasgow Coma Scale in neurological assessment among nurses working in critical care units, showed that nurses did not have the required level of knowledge. This study revealed that 74% of the staff nurses had average knowledge and 25% had poor knowledge.

A study conducted in Brazil on the assessment of nurse's knowledge of the Glasgow Coma Scale at a university hospital, has shown a low adherence to GCS use, difficulties in its application and failures of professionals related to consciousness evaluation, such as lack of standards and poor knowledge about the scale. In addition, the hospital routine leads to prioritization of other organic systems, indicating that only 42.7% of nurses use this scale to assess consciousness (Santos et al., 2016).

In another study conducted in Switzerland on knowledge of the Glasgow Coma Scale by air-rescue health professionals regarding GCS components, the nurses presented a higher rate of incorrect answers (28.7%) for the question about the name of each component, while only 5.8% of air rescue physicians made errors (Heim et al. 2009). Similarly, a study in Jordan showed that nurses lack the basic knowledge about the GCS (Quraan & AbuRuz, 2016).

Following a study done at the University of Malaya, Kuala Lumpur, Malaysia, the results showed that 55.56% of nurses had poor knowledge, followed by 41.48% with satisfactory knowledge and 2.96% with good knowledge.

A study conducted in Nigeria on Physicians' knowledge of the Glasgow Coma Scale in a Nigerian hospital, showed that 89% correctly identified the eye opening variable (best eye opening, BEO); 80% the verbal response variable (best verbal response, BVR); and 61% the motor response (best motor response, BMR). Only 55% of the participants correctly identified all the clinical variables of the GCS (Adeleye, Owolabi, Rabi, & Orimadegun, 2012). A study done in the same country on nurses' knowledge of the Glasgow Coma Scale in the neurological assessment of patients in a selected tertiary hospital, the results showed that 41.7% of the respondents had good knowledge; 25% moderate knowledge; and 33.3% had poor knowledge of the GCS (Ehwarieme & Anarado, 2016).

2.2 Nurses practice when scoring critically ill patients using the GCS

The GCS reflects the initial severity of brain dysfunction, while serial assessments demonstrate the evolution of the injury. Each is crucial for decision making. The GCS is also a guide for prognosis and an essential tool for research studies. To promote a more consistent use of the GCS, there is a standardized, structured approach to assessment. The GCS has been updated since it was first developed to include some of the original principles in the application of the scale and draws on subsequent reviews and proposals for practice (Thi & Chae, 2011).

The principle of assessing an individual's level of consciousness is about determining the degree of (increasing) stimulation that is required to elicit a response from them, based on three modes of behavior: eye opening, verbal response and motor response. The findings in each response are described in clear terms, aimed at minimizing ambiguity. However, the precise wording used in the GCS has varied over time; the fingernail is the recommended site for peripheral stimulus (Brennan et al., 2016).

Pressure on the side of the finger has been proposed as an alternative to the nail bed because of concerns that undue force can result in damage (Waterhouse, 2009; Palmer and Knight, 2006). However, instances of damage to the nail are extremely rare and there is a lack of evidence that responses to the different sites are equivalent. Stimulation by rubbing the knuckles on the sternum is strongly discouraged; it can cause bruising and responses can be difficult to interpret (Shah, 1999).

In a study conducted on third year nursing students in Korea, only 64% of the students felt the GCS was a very important scale in the neurological field, and an extremely low percentage (15%) felt very confident in GCS practice. These results imply that more experiences in clinical settings will likely lead to higher confidence and belief in GCS scoring.

2.3 Factors which inhibit nurses correctly assessing the GCS of patients

There are several factors that determine the nursing care and assessment achieved during application of the GCS. These include inadequate knowledge, attitude, lack of self-confidence, educational background and demographic factors such as age and gender (Chan Moon Fai, Mattar Ihsan, 2013). Similar factors were found in Singapore National University in a study done on investigating nurses' knowledge, attitudes and self-confidence patterns to perform the conscious level assessment, where by younger nurses were more accurate in using the GCS. Some studies reported that well-trained nurses were more consistent and accurate in use of the GCS. Nurses who had formal training in the use of the GCS were more accurate as compared with newly graduated nurses and student nurses (Lee, Studies, & Loo, 2013).

Another study which aimed at determining nurses' self-confidence and attitudes in using the Glasgow Coma Scale, reported significant differences in the age and education. With respect to age, younger nurses were found to be more accurate in their use of the GCS. In terms of education, nurses with critical care qualifications were found to be less accurate when compared to nurses holding undergraduate degrees and diploma qualifications. No explanation has been offered for these counter-intuitive findings; one would assume that nurses with specialty training would have more accurate findings than those with generalized qualifications. Nurses who are self-confident in using the GCS have a greater proficiency in assessment. Thus, their attitudes would be more positive towards its benefits and they would be supportive towards its use in the clinical setting. (Mattar, Liaw, & Chan, 2014).

CHAPTER THREE:

3.0 STUDY METHODOLOGY

3.1 Study design

A cross sectional descriptive study design was used in order to give a detailed description of the nurse's knowledge, practice and factors associated with following the GCS among nurses. In a cross sectional study, data was collected at one point in time; the phenomena under study were captured during one period of data collection (Polit and Beck, 2008). A quantitative approach was used to collect and analyze data from the study participants; data was quantified in numerical values and percentages to enable statistical inferences. A quantitative method was chosen because it enables the researcher to test the relationship and examine cause and effect among dependent and independent variables.

3.2 Site and Setting

The study was conducted in the Emergency Medicine Department (EMD) and Intensive Care Unit (ICU) at two hospitals, Muhimbili Orthopaedic Institute and Muhimbili National Hospital. The selection of the sites was based on the following reasons; both had an EMD and an ICU which commonly admit critically ill patients with altered levels of consciousness and neurological patients who required regular assessment using the GCS. This allows for direct comparison between nurses at the two hospitals. Muhimbili National Hospital is the national referral hospital while Muhimbili Orthopaedic Institute is the national trauma referral hospital, which deals with trauma and neurological patients. Both are in Dar-es-Salaam, the largest city in the country with an estimated population of four million (2012 census). They are in Ilala Municipality. MOI has a bed capacity of 328 and MNH has a 1500 bed capacity; They are also teaching hospitals, working together with Muhimbili University of Health and Allied Science (MUHAS); These hospitals receive referred critically ill patients from all parts of the country, while others become critically ill during their admission to the hospitals; They have designated units for stable critically ill patients (medical and surgical), but also special units for patients with emergencies, requiring intensive care, and specialized

neurological units for adults; Nurses working in these specialized areas should have a high level of knowledge about how to care for critically ill patients, and therefore be the most skilled nurses in the hospital. Nurses qualifications range from a certificate, to a diploma, to a Bachelor's degree and up to a Master's degree in nursing.

3.3 Study Population

The target population was registered nurses working in EMD and ICU at MOI and MNH. The participants were selected because they spend most of their working hours with critically ill patients who need to be assessed by using the GCS.

3.4 Sample size

The sample size was all registered nurses working in the Emergency Medicine Departments and Intensive Care Units at MOI and MNH where nurses assess critically ill patients by using the GCS.

The sample size for the study was calculated using Kish Leslie formula as follows:

$$n = Z^2 P (100-P) / E^2$$

n=Minimal required sample size

Z =Percentage point of normal distribution 1.96 corresponding to 95% confidence interval

E=Maximum likely error/margin of error set at 5

P=Prevalence from previous studies =89.8% taken from a study done in Brazil on The Assessment of nurse's knowledge about Glasgow Coma Scale at a university hospital (Santos et al., 2016)

$$n = 1.96^2 \times 89.8 (100-89.8) / 5^2 = 3517 / 25 = 140.68 = 141$$

Therefore, the sample size was calculated to be 141.

To adjust for non-responses, 10% of the calculated sample size was added to N as follows

$$n=141 \times 100 / 100 - 10 = 156.67 = \mathbf{157}$$

Therefore, the sample size was 157. Non-respondents were those who refused to participate or those who did not complete the questionnaire.

3.5 Sampling procedure

A convenience sampling method was used from which participants were recruited. The researcher approached each of the nurses available during the time of data collection. All nurses at the selected units who were eligible to participate in the study were given an explanation about the purpose of the study and their participation was requested. Then the nurses who wished to participate would read and sign a consent form.

3.6 Inclusion criteria

Registered nurses who had worked in the Emergency Medicine Department and Intensive Care Unit for more than a year and who were licensed by the Tanzanian Nurses and Midwife Council were included.

3.7 Exclusion criteria

Those nurses with less than one year experience, nurses with a certificate and those who were not at their work place during the data collection period, such as those were on full time study leave, annual or maternity leave, and those who were sick were excluded.

3.8 Data collection instruments

Data was collected first by using an observation checklist (See Appendix B). Since assessing knowledge may have an effect on practice in this study observation of practice took place first, before administration of questionnaires. The second instrument was a self-administered, structured questionnaire which contained both open and closed ended questions. (See Appendix A section A, B & C). The questionnaires were administered in the two day shifts; morning shift that begins at 7:30am-2:00pm; evening shift ranging from 2:00-8:00pm. The researcher and the research assistants were available on each shift and were responsible for providing consent forms; administering questionnaires; assisting participants for any clarification; and collecting completed questionnaires to

deliver to the principal researcher. It was estimated that filling in one questionnaire would take about 30 to 40 minutes. The check list was filled by the principal researcher.

The tools were in English and Swahili, but the English tool was used because the participants preferred to use the English language, as they said some scientific words are difficult to write in Swahili. Also, all nurses in Tanzania receive their training, using the English language. The questionnaire was developed after an extensive literature review; and consultation with nursing specialists in critical care and trauma. This data collection tool consisted of four sections. Section A consisted of questions about socio-demographic information listing six questions and section B was for the assessment of a nurse's knowledge, containing twelve questions. Section C consisted of factors associated with the GCS application among nurses, with four questions.

3.9 Validity and Reliability

Validity: is the degree to which an instrument measures what it is intended to measure (Polit and Beck, 2012). The structured questionnaire was developed by the investigator after a thorough literature review, and it was used for data collection. The questionnaire was reviewed by two critical care nurse specialists in order to establish content validity. The reviewers were asked to review clarity of all test questions, and make suggestions for changes. The changes and suggestions were incorporated in the final version of the questionnaire. To ascertain validity, the questionnaire was formulated in English and Kiswahili to test if it conveyed the intended meaning.

Reliability: This is the internal consistency or dependability with which an instrument measures the attribute or variable to establish if participants in the study were able to understand the instructions and respond correctly. Both open and closed ended questions were used to test the participants practice and were objective and focused in order to strengthen reliability.

Moreover, the researcher conducted a pre-test of the tools to establish validity and reliability. In this case, the questionnaires were pre tested with 5 nurse' specialists in

critical care from MNH, 8 nursing officers from MOI and 2 nursing students to evaluate if the nurses completely understood the questions. To ensure reliability of the instrument, the researcher calculated Cronbach's Coefficient during the pre-test using SPSS version 21 software.

3.10 Variables

3.10.1 Independent variable

The independent variables were age, sex, current employment position, level of nursing education, years of working in ICU and EMD and any recent training on GCS.

3.10.2 Dependent variable

The dependent variables were knowledge and practice in application of GCS.

3.11 Training the researcher assistants

The study included two research assistants who supported data collection. At the beginning of the activity, there was two days of training, including an explanation on the nature of the study, objectives, rationale and the data collection tools. Teaching the research assistants helped them to gain knowledge about the study and thereafter, better results were anticipated.

3.12 Data analysis

Generally, data entry and cleaning was done by the principal investigator with the aid of a Statistician. All the questionnaires were coded and entered into the computer software with the assistance of a statistician in order to ensure quality data entry. Data was subsequently analyzed using Statistical Package of Social Science (SPSS) version 21 with the assistance of a data manager. Knowledge of participants was measured by marking the participant's choice. That was, participants who selected all correct answers from all questions, were considered to have a high level of knowledge and score 9 marks. While participants who selected the wrong answer from a certain question were considered to have no knowledge on that item and scored 0. The total score was computed to obtain total marks out of 100%. The level of knowledge was measured

using a grading scale adopted from the Tanzanian ministry of health training unit. The Researcher modified the grading scale of competence into 3 categories; among nine questions, each question was assigned 11 marks therefore those who got 7-9 questions right scored 70% and above and were regarded as having high knowledge. A score of 50% to 69% meant correctly answering 4-6 questions and the nurse was regarded as having a moderate level of knowledge, while those who scored < 49% (correctly answered three or less than three questions) were regarded as having a poor level of knowledge. The findings of knowledge and practice are presented in tables, and histograms. Continuous variables are presented as a mean, and nominal as a percentage. The chi square (X^2) test was used to compare the association between knowledge on the application of the Glasgow Coma Scale among participants and selected variables like age, level of education, working experience and whether participants had ever heard about GCS. P value of 0.05 was taken as critical point for statistical significance.

3.13 Ethical consideration

The investigator sought ethical clearance from Muhimbili University of Health and Allied Sciences (MUHAS) at the Directorate of Research and Publications prior to the study. Permission to conduct the study was obtained from Executive Director of MNH and MOI, Director of Clinical Services MNH and MOI, and finally from the head of ICU and EMD, at MNH and MOI. Participants were assured of anonymity and confidentiality throughout the study. The questionnaire was completed in a conducive environment with no interference from others. Written consent was sought from participants prior to their participation in the study. This required the aims of the study to be explained to them, while the confidentiality and privacy of the study participants was maintained. The participants were assured that their participation was totally voluntary and that if they chose not to participate in the study, it would not affect them, in any way. Filled questionnaires were kept under lock and key and only accessible by the researcher. Access to data entered on a computer file was through a password known to the researcher only.

3.14 Dissemination of the findings

A research report will be presented to the School of Nursing and director of Postgraduate Studies at MUHAS as partial fulfillment of the requirements for the award of a Master's degree in Nursing. The results of the study will be communicated to Muhimbili Orthopedic Institute (MOI) and Muhimbili National Hospital (MNH). Efforts will be made to publish the results in a peer reviewed scientific journal and make presentations at seminars, workshops and scientific conferences. Hard and soft copies will be availed to MUHAS library, MOI and MNH Medical library, and finally the Ministry of Health and Social Welfare

CHAPTER FOUR

4.0 RESULTS

This chapter presents the results on the nurses' knowledge and practice in the application of the Glasgow Coma Scale at Muhimbili National Hospital and Muhimbili Orthopaedic Institute, Dar es Salaam. A total of 158 nurses were recruited into the study and included in the final analysis. This chapter summarizes the results according to the objectives of the study and has been divided into four sections which are socio-demographic characteristics, nurses' knowledge during application of the GCS, the practice of nurses while assessing the patients and the factors associated with application of the GCS among nurses.

4.1: Socio-demographic description of the study participants

A total of 158 nurses participated in the study. Their ages ranged from 21 to 49 years with a mean of 33 years. More than half (55.1%) were aged between 25 to 34 years. Many of them (69.6%) were females. Most(62.7%)of the participants had a diploma in general nursing education and only 4 (2.5%) of them had a Master's degree and above. The results showed that, the majority of participants, 65.0%, had between 1 to 6 years of work experience, and only 3.8% had been working 15 years or more.

Table 2: Variation of Demographic Characteristics of the Study Sample by Hospital...

	Hospital		
	Frequency (%)		
Age Group (years)	Muhimbili National Hospital	Muhimbili Orthopedic Institute	Total
≤24	3(50)	3(50)	6(100)
25 – 34	53(60.9)	34(39.1)	87(100)
≥ 35	33(50.8)	32(49.2)	65(100)
Total	89(56.3)	69(43.7)	158(100)
Sex			
Male	32(66.7)	16(33.3)	48(100)
Female	57(51.8)	53(48.2)	110(100)
Total	89(56.3)	69(43.7)	158(100)
Current employment position			
Assistant nursing officer	57(57.6)	42(42.4)	99(100)
Nurse Officer	32(54.2)	27(45.8)	59(100)
Total	89(56.3)	69(43.7)	158(100)
Highest level of education earned in nursing			
Diploma	57(57.6)	42(42.4)	99(100)
Bachelor degree	30(53.6)	26(46.4)	56(100)
Master's degree and above	3(75)	1(25)	4(100)
Total	89(56.3)	69(43.7)	158(100)
Work experience in the Emergency Medicine Department/ Intensive Care Unit			
1-6 years	63(61.8)	39(38.2)	102(100)
7-14 years	20(40.8)	29(59.2)	49(100)
15 years and above	5(83.3)	1(16.7)	6(100)
Total	88(56.1)	69(43.9)	157(100)

Generally, nurses in this study who had a higher level of education, had less work experience. While the nurses who had a lower level of education, had more work experience, both in the Emergency Medicine Department and the Intensive Care Unit. So, all nurses with a Masters level of education had only 1-6 years of work experience. While some of those with a Diploma in Nursing had worked for more than 15 years (5.1%) and others, (34.7%) had been working for 7-14 years, with (60.2%) having 1-6 years' work experience. However, this association was not statistically significant when tested by the Exact test (Fisher's Exact test = 3.965, p-value=0.420), (Table 3).

Table 3: Distributions of nurses' work experience in the Emergency Medicine Department/ Intensive Care Unit over their highest education level

	Work experience in the Emergency Medicine Department/ Intensive Care Unit				Fishers Exact test
	Frequency (%)				
Highest level of education earned in nursing	1-6 years	7-14 years	15 years and above	Total	p-value=0.420
Diploma	59(60.2)	34(34.7)	5(5.1)	98(100.0)	
Bachelor degree	39(70.9)	15(27.3)	1(1.8)	55(100.0)	
Master's degree and above	4(100.0)	0(0.0)	0(0.0)	4(100.0)	
Total	102(65.0)	49(31.2)	6(3.8)	157(100.0)	

The majority, 149 (94.3%) nurses, in this study had cared for patients with an altered level of consciousness who required assessment by using the GCS. Almost half of the nurses (47.6%) had never attended any type of GCS training, compared to 45.6% of participants who had attended training. More than half (58.4%) the proportion of nurses who had cared for a patient with an altered level of consciousness by using GCS were from Muhimbili National Hospital. Also, more than half (54.2%) of those nurses who had ever attended training were from Muhimbili National Hospital, (Table 4).

Table 4: Proportion of Nurses who have cared for patients with an altered level of consciousness and who have attended GCS training

	Hospital		
	Frequency (%)		
Have you ever cared for a patient with an altered level of consciousness who required assessment of their GCS?	Muhimbili National Hospital	Muhimbili Orthopedic Institute	Total
Yes	87(58.4)	62(41.6)	149(100)
No	2(22.2)	7(77.8)	9(100)
Total	89(56.3)	69(43.7)	158(100)
Have you had any recent training about GCS?			
Yes	39(54.2)	33(45.8)	72(100)
No	47(62.7)	28(37.3)	75(100)
I don't know	3(27.3)	8(72.7)	11(100)
Total	89(56.3)	69(43.7)	158(100)

4.2 Determining nurses' level of knowledge in the application of GCS working in the Intensive Care Unit and Emergency Medicine Department at Muhimbili National Hospital and Muhimbili Orthopedic Institute, Dar es Salaam.

Each participant was asked nine questions about their knowledge of the GCS and its application. The mean score of nurses' knowledge in the use of GCS is 5.08 (STD dev. =2.924).

4.2.1 Participants responses to Knowledge Testing Questions.

More than half (56.3%) of the participants did not know the lowest score for the scale. 78.8% were unable to identify a GCS score that indicates a critical situation the examiner should be aware of while assessing the patients. Along with 62.0% who were unable to identify the range of GCS results that indicates a moderate head injury. A large proportion (72.2%) could not identify that the most adequate response recorded for the GCS, should be the patient's best response. Exactly 69.0% of nurses did not know how to begin when assessing eye opening. Furthermore, more than half (53.8%) of nurses did not know how to begin to assess the patients best verbal response during examination, by asking the patient simple questions about self, location and time. A large proportion (73.4%) of nurses did not know how to begin when assessing the best motor response.

Table 5: Participants responses to Knowledge Testing Questions.

Function of GCS	Frequency	Percent
Incorrect answer	35	22.2
Correct answer	123	77.8
Total	158	100.0
Components of GCS are:		
Incorrect answer	40	25.3
Correct answer	118	74.7
Total	158	100.0
Lowest score for the scale is:		
Incorrect answer	89	56.3
Correct answer	69	43.7
Total	158	100.0
A GCS score of a critical situation		
Incorrect answer	124	78.5
Correct answer	34	21.5
Total	158	100.0
The results that indicate a moderate head injury are between		
Incorrect answer	98	62.0
Correct answer	60	38.0
Total	158	100.0
On use of GCS, the most adequate response for the score		
Incorrect answer	114	72.2
Correct answer	44	27.8
Total	158	100.0
To assess eye opening, the examiner should begin with:		
Incorrect answer	109	69.0
Correct answer	49	31.0
Total	158	100.0
To assess the best verbal response, the examiner should begin with		
Incorrect answer	85	53.8
Correct answer	73	46.2
Total	158	100.0
To assess the best motor response, the examiner should begin with:		
Incorrect answer	116	73.4
Correct answer	42	26.6
Total	158	100.0

Apart from scoring a certain question with either correct or incorrect answers, the participants were graded based on their total scores from the knowledge part of the questionnaire using a grading scale as high, moderate or low level of knowledge.

Figure 2 shows, most nurses had insufficient knowledge about the use of GCS for measuring a patient's consciousness. For instance, half (50.0%) of the nurses had a low level of knowledge, while only 13.3% of nurses had a high level of knowledge about the scale.

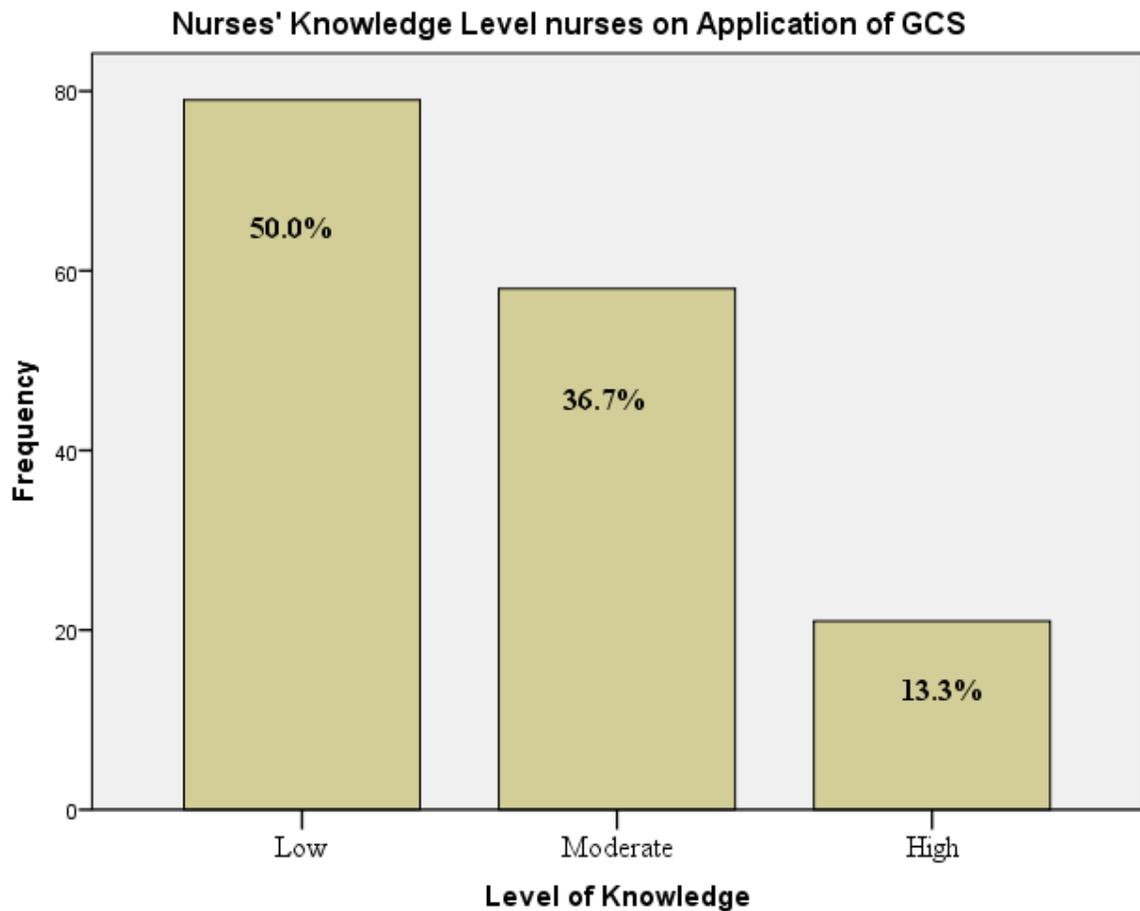


Figure 2: Level of knowledge of nurses on application of the GCS

4.3 Determining the nurses' practice of scoring critically ill patients by using GCS

The practice of the application of GCS for assessment of critically ill patients was observed for 118 nurses and their actions were recorded on a checklist.

In observing the 'Eye opening response' a large proportion of participants (71.2%) were not causing the patient pain to see if they could open their eyes to painful stimuli. Also, nearly three quarters of the nurses (73.7%) did not acknowledge that no eye opening occurred, even after application of all previous described stimuli.

Table 6: Nurses' practice when scoring critically ill patients on Eye Opening when using the GCS

Observe if patient open eyes spontaneously	Frequency	Percent
Yes	110	93.2
No	8	6.8
Total	118	100.0
Calls and commands patient and observes if patient opens the eyes		
Yes	74	62.7
No	44	37.3
Total	118	100.0
Causes pain to the patient to see if eyes open with painful stimulus.		
Yes	34	28.8
No	84	71.2
Total	118	100.0
Acknowledges if no eye opening occurred after application of all previously described stimuli		
Yes	31	26.3
No	87	73.7
Total	118	100.0

4.3.1 Nurses' practice whenscoring 'Best Verbal Response', during assessment of their patients GCS

In observing 'Best Verbal Responses', more than three quarters(85.5%) of the nurses did not examine the patients for incomprehensible speech. And also, more than three quarters of participants (76.9) did not observe whether there was verbalization of any type from the patient, (Table7).

Table 7: Results on nurses' practice when scoring 'Best Verbal Response', during assessment of their patients GCS

Asks the patient to assess orientation to time, space and aware of the self		
Yes	98	83.1
No	20	16.9
Total	118	100.0
Able to test whether patient can answer questions, but incorrectly, as they are disoriented and confused		
Yes	60	51.3
No	57	48.7
Total	117	100.0
Able to detect incomprehensible speech from patients		
Yes	17	14.5
No	100	85.5
Total	117	100.0
Can identify if there is no verbalization of any type		
Yes	27	23.1
No	90	76.9
Total	117	100

4.3.2: Nurses' practice when scoring 'Best Motor Response' of the patient when applying GCS.

During observation of the 'Best Motor Response', more than half of the participants (54.7%) were not observing if there was localization in response to painful stimulus. Also, 82.1% of nurses were not identifying if a patient was able to withdraw from pain. The majority of nurses (92.3%) were not able to identify abnormal movement also called (spastic) flexion or decorticate posture and also, the majority of them (93.2%) were not detecting extensor (rigid) response, or decerebrate posture. Furthermore, 85.5% of them were not identifying if the patient showed no response even after application of all previous described stimuli, as summarized in **Table 8** below.

Table 8:Nurses practice when scoring ‘Best Motor Response’ of the patient when applying GCS

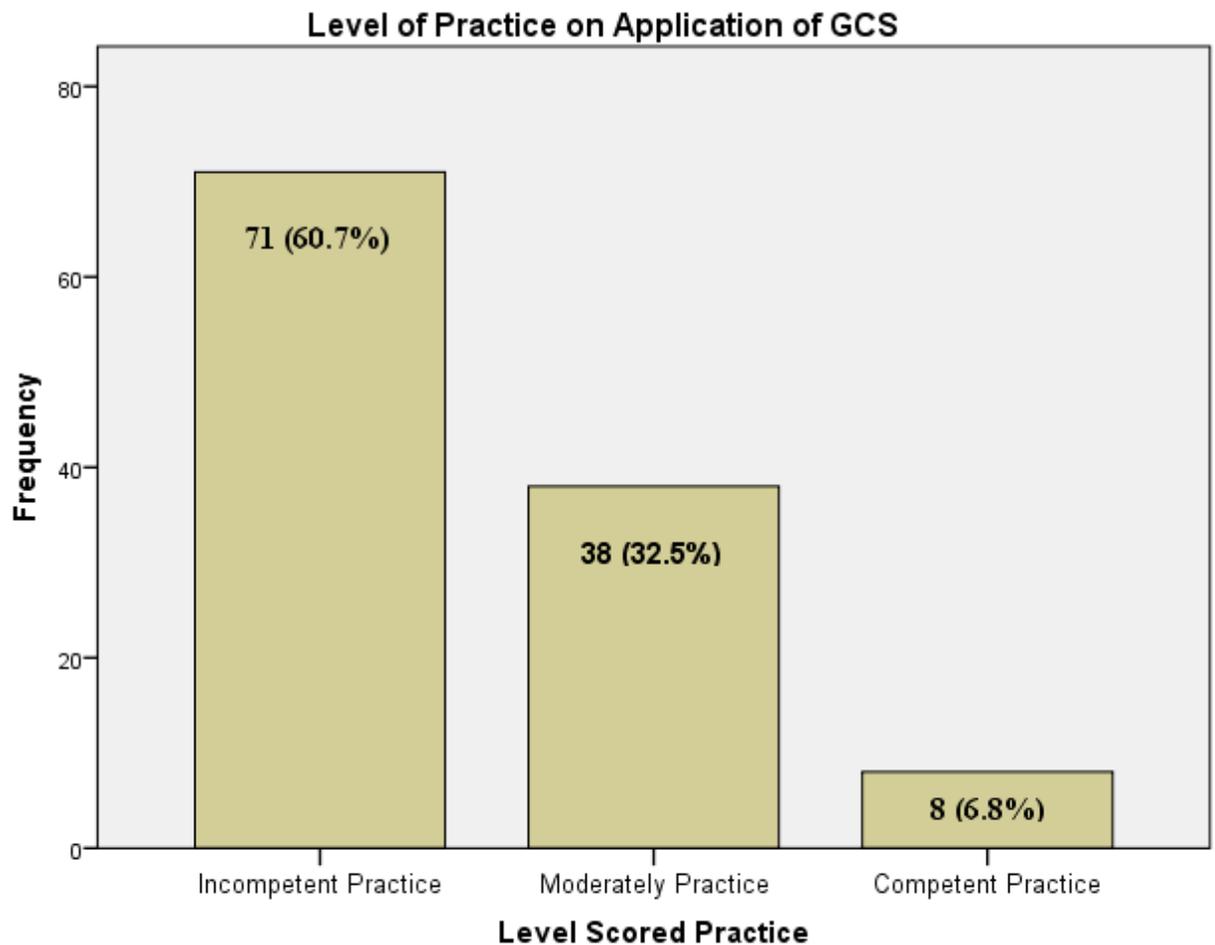
Observes if patient obeys a command for movement.		
Yes	104	88.9
No	13	11.1
Total	117	100
Observes if there is localization in response to pain stimulus.		
Yes	53	45.3
No	64	54.7
Total	117	100.0
Observe if patient is able to withdraw from pain.		
Yes	21	17.9
No	96	82.1
Total	117	100.0
Observe abnormal movement (spastic) flexion, decorticate posture		
Yes	9	7.7
No	108	92.3
Total	117	100.0
Detection of extensor (rigid) response, decerebrate posture		
Yes	8	6.8
No	109	93.2
Total	117	100.0
Identify if no response even after application of all previous described stimuli.		
Yes	17	14.5
No	100	85.5
Total	117	100.0

The study revealed that there are few nurses who are competent in assessing the GCS.

Nurses who correctly applied the GCS to assess their patient were deemed competent. If a nurse assessed their patients knowing less than half of the correct steps for GCS, they were assessed as being incompetent. And the nurses who applied the GCS in between

these two levels were given a moderate level of competency. A large proportion of them (60.7%) had incompetent practice in the application of GCS when assessing critically ill patients as summarized in (Figure3 below)

Figure 3: Level of nursing practice when applying the GCS in the assessment of critically ill patients at Muhimbili National Hospital and Muhimbili Orthopedic Institute



4.4.0: Comparison of factors associated with following the correct application of GCS

Table 9, shows nurses who had a Diploma level of education were ten times more likely not to apply the GCS in assessment of patients, as compared to those who had Bachelor education level, however the association was not statistically significant ($p=1.000$). Also, those not having attended any GCS training were 8 times more likely to not to use the GCS assessment, compared to those who attended the GCS training, and the association was statistically significant ($p=0.001$). In work experience, those with more experience (7 -14 years) were 4 times more likely to ignore application of the GCS in the assessment of patients compared to those with less years of experience (1 - 6 years). This association was also statistically significant ($p=0.009$).

Table 9: Multivariate analysis of determinants of Nurse' factors that are associated with following the application of GCS

	Does your normal handover to other nurses include reporting the GCS?			AOR (95% CI)	P-value
	Frequency (%)				
Highest level of education earned in nursing	Yes	No	Total		
Diploma	70 (71.4)	28(28.6)	98(100.0)	10.6(0.00-undefined)	1.000
Bachelor degree	54(96.4)	2(3.6)	56(100.0)	Reference	
Master's degree and above	4(100.0)	0(0.0)	4(100.0)	0.0(0.00-underfined)	0.999
Total	128(81.0)	30(19.0)	158(100.0)		
Have you had any recent training about GCS?					
Yes	68(94.4)	4(5.6)	72(100.0)	Reference	
No	60 (69.8)	26(30.2)	86(100.0)	8.6(2.402-30.749)	0.001

Total	128(81.0)	30(16.0)	158(100.0)		
Work experience in the Emergency Medical Department/ Intensive Care Unit					
1-6 years	91(89.2)	11(10.8)	102(100.0)	Reference	
7-14 years	30(61.2)	19(38.8)	49(100.0)	4.4(1.444-13.114)	0.009
15 years and above	6(100.0)	0(0.0)	6(100.0)	0.0(0.000-undefined)	0.999
Total	127(80.9)	30(19.1)	157(100.0)		
Current employment position					
Assistant nursing officer	71(71.7)	28(28.)	99(100.0)	1.4(0.000- undefined)	1.000
Nurse Officer	57(96.6)	2(3.4)	59(100.0)	Reference	
Total	128(81.0)	30(19.0)	158(100.0)		
Do you think it is important to assess and record a GCS for every patient who has altered mental status?					
Strongly agree	65(92.9)	5(7.1)	70(100.0)	Reference	
Agree	41(78.8)	11(21.2)	52(100.0)	2.8(0.736-10.566)	0.131
Neither agree nor disagree	14(56.0)	11(44.0)	25(100.0)	10.5(2.327-47.448)	0.002
Disagree	6(75.0)	2(25.0)	8(100.0)	1.3(0.150-11.266)	0.811
Strongly disagree	2(66.7)	1(33.3)	3(100.0)	2.6(0.179-37.566)	0.485
Total	128(81.0)	30(19.0)	158(100.0)		

4.4.1: Patients' conditions assessed by GCS

When asked which patients they would use the GCS to assess, nurses identified several conditions. These conditions included a patient with a head injury (55.7%), CVA/Stroke (31.0%), unconscious patients (29.7%), trauma patients (15.8%), seriously ill patients (12.7%), any patient with altered mental status (12.7%), brain tumor (5.7%) and altered level of consciousness patients (1.3%).

4.4.2: Factors which make it difficult for nurses to assess the patients by using GCS

As stated by participants, factors which make it difficult for nurses to assess patients by using the GCS include lack of knowledge on the application of GCS among nurses (19.6%), work overload of nurses (19.6%), shortage of nurses (15.2%), lack of resources (14.6%), lack of skills among nurses (5.7%), absence of a clear chart for scoring patients (5.7%), lack of in-service training (5.1%) and aggressive patients (2.5%).

CHAPTER FIVE

5.0 DISCUSSION OF RESULTS

The chapter discusses practice, knowledge and the factors associated with applying the GCS when assessing patients, among nurses working in the Intensive Care Unit and the Emergency Medicine Department at Muhimbili National Hospital and Muhimbili Orthopedic Institute.

5.1 Demographic characteristics

The Glasgow Coma Scale (GCS) is a reliable and valid tool to measure the level of consciousness. Nursing professionals are responsible for ongoing monitoring and identification of altered consciousness levels in patients, especially for critically ill patients. Hence it is vital for nurses to acquire accurate knowledge and skills in using the GCS.

A total of 158 nurses participated in this study; more than half (55.1%) were aged between 25 to 34 years. Many of them (69.6%) were females. The high percentage of female nurses in the study is due to the dominance of females in the nursing profession in Tanzania. The majority (62.7%) of the participants had a diploma in general nursing. This is because in Tanzania students must complete high school in order for them to study a bachelor's degree. Most students do not achieve the score required to progress to high school, and therefore a degree level of education. So the nurses will complete a diploma and work their way up from there. The results showed that the majority of participants(65.0%) had work experience of between one to six years. In relation between age and years of experience, more than half of the nurses were in the age range between 25-34 years old and had 1-6 years of work experience in caring for critically ill patients. These findings are similar to a study done in Brazil by Santos and colleagues (2016), where in their research entitled "Assessment of Nurse's Knowledge about Glasgow Coma Scale", at a university hospital; found that the majority of study participants were women compared to men.

5.2 Knowledge related to the application of GCS.

In this study, most of the participants' knowledge level scores in application of the GCS were low (50.0%). These low knowledge scores in application of the GCS were unexpected to the researcher. The initial assumption was that nurses have a high level of knowledge in application of the GCS due to the fact that during their basic educational program they cover a topic on neurological assessment, including assessment of patients by using GCS, but the findings were contradictory to this assumption. This could be due to the fact that the majority of nurses had a diploma level of education and therefore they did not have enough knowledge in utilising the GCS while caring for critically ill patients. The same responses were also identified in the results of research done by Thi Hien and Chae (2011), where they concluded that the nurses were lacking the necessary knowledge about GCS especially when it comes to the clinical setting. However, very few nurses (13.3%) indicated that their current knowledge on the application of GCS is adequate. This percentage is lower than that reported in Nigeria by Anarado and colleagues (2016) in a similar study where 41.7% of nurses reported to have a good level of knowledge of the GCS.

As shown in the Conceptual framework in Figure 1, the lack of knowledge about how to score patients using the GCS and continuous professional education are the key factors that can lead to inadequate knowledge of the GCS application, as well as years of experience working in critical care areas. This ultimately hinders proper application of the GCS during assessment of critically ill patients. In addition to that, nurses in this study who had a higher level of education, had less work experience (60.2%) and as the level of education increased there was a better performance on the GCS assessment. This indicates that the higher the level of education ensures a higher level of competence in the application of procedures including GCS assessment. The nurses with more work experience had a lower level of education and therefore knowledge about GCS. Perhaps this can be attributed to lack of continuing nursing education, in-service teaching and a lack of resources. The nurse may have forgotten how to assess a patient using the GCS

and there is no supervision of their practice to remind them they are expected to use the GCS assessment and how to do it correctly. Nurses learn about the GCS assessment during their training at their schools, however the results show their knowledge and practice are sub-optimal, indicating they may learn about the GCS, but do not practice it. If their knowledge translated into practice, with supervision, they would memorise the scoring process and apply it easily to all their patients.

Perhaps more emphasis has been placed on teaching the GCS to students in recent years, so they are aware of the importance. This may explain why nurses with less experience, have a higher level of knowledge. In this study about half (47.6%) of the nurses had never attended any GCS training and this is supported by results of a study conducted in USA by Nihmatolla, *et al.* (2005) who reported that 95% of the nursing staff had no training sessions after graduation about GCS. As shown in the conceptual frame work, the presence of in service training for nurses is one of the major factors that promotes quality GCS assessment and ultimately, optimally improves their patient's outcome if deterioration is noticed promptly during application of the scale when assessing critically ill patients. This implies that there may be a lack of, or minimal in service training on GCS assessment among nurses at Muhimbili National Hospital and Muhimbili Orthopedic Institute, which may lead to poor patient outcomes for critically ill patients.

5.3 Factors that inhibit nurses correctly assessing the GCS of patients.

In this study, several factors that may affect the ability of nurses to assess their patients correctly during the application of the GCS were mentioned. Lack of knowledge on the application of GCS among nurses (19.6%), work overload of nurses (19.6%), shortage of nurses (15.2%), lack of resources (14.6%), lack of skills among nurses (5.7%), absence of a clear chart for scoring patients (5.7%), lack of in-service training (5.1%) and aggressive patients (2.5%) were all the factors identified. Similar findings were reported in studies conducted by Lee and colleagues (2013). Even though the nurses mostly scored very low in the knowledge area of the GCS, only 5.1% of them identified

that lack of training was a gap. This implies that they do not have insight into what could improve their skills when assessing their patients. The nurses' lack of knowledge in the use of the GCS may overlook the neurological changes in a patient, resulting in late detection of deterioration and thus delayed interventions. Together with the above mentioned factors, a lack of knowledge and training about GCS does affect the accuracy and inter-rater reliability among health care professionals. This affirms findings reported by Mattar & Chan (2013), on a study done in Singapore which was investigating factors that have an impact on nurses' performance of patient's conscious level assessment.

Lack of knowledge and lack of in-service training on the GCS assessment and application were reported by the nurses to be factors that decreased their ability to assess patients correctly. This may contribute to inadequate quality care being delivered to critically ill patients. The current findings support Riechers and colleagues (2005) study findings of California, which revealed that trained providers were able to identify the correct categories 20–30% more often than those without training, and the trained nurses provided more accurate scoring information. Having competent skills and ongoing in-service training enables the nurses to have the best performance and ensures they are able to apply the GCS correctly, which is crucial when scoring and assessing critically ill patients.

In addition to that, lack of resources were also reported to be a factor which interfered with GCS assessment because most of the nurses in the studied areas, such as the Emergency Medicine Department, were lacking a GCS chart which is used regularly as a reference tool for assessment. The EMD uses a computer system to record the GCS, but it is not located with the vital signs documentation. It is in a separate section, entitled "Trauma Score", which the nurse may not think to use, if the patient has not been involved in a trauma. There is no prompt or mandatory completion of GCS in the computer system used in the EMD. Along with this, there is no chart in the rooms for nurses to refer to if they forget a component of the GCS.

In summary, inadequate knowledge and skills of nurses are the core factors that lead to ineffective application of GCS while caring for the critically ill patient. These factors were even cited as reasons among those who did not apply the GCS for assessment of their patients.

Suggestions for improvement on nurses GCS assessment and application include in-service training, and a well-developed GCS training program that should be delivered to the nurses. It should contain information on the accurate assessment of the consciousness level when using the GCS, including clear instructions of application to practice, which ultimately results in improving the quality of nursing care provided. Similar suggestions were recommended by the author in the study conducted by Nguyen(2011). He states that if the nurse has accurate knowledge, they provide better patient care and concludes that training is the key to ensure this happens.

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

Nurses have a low level of knowledge about the GCS assessment. More than half of the nurses did not know the lowest score for the GCS. They could not identify which score of the GCS indicated a patient was in a critical neurological condition. There was a large discrepancy between the knowledge scores and the nurses' perception about their current knowledge. There was less understanding of the neurological bases, and clinical application of the GCS, with lack of continuing educational updates on the GCS. Nurses reported they were overworked and lacked resources which hindered their ability to use the GCS in their daily practice. These factors, together with inadequate knowledge will limit their capacity for assessment, clinical judgment and decision making in managing unconscious or deteriorating patients.

6.2 Recommendations.

This study raised important themes and issues related to knowledge and practices about the GCS assessment and application among nurses at Muhimbili National Hospital and Muhimbili Orthopedic Institute, Dar es Salaam, of which the researcher and practitioners should take note. The recommendations include improving training and research, as well as hospital and policy makers influencing change. These suggestions follow here.

Nurses are recommended to:

1. Put more effort into updating their knowledge, as well as practice, on the GCS assessment. Nurses need to take some responsibility for their practice and understand what is required of them to provide the best possible care to their patients.
2. Attend frequent refresher courses and formal training programs. Increased continuous professional education about the GCS requires integration into the critical care setting for the existing trained staff to keep them up-to-date. Hands-

on skills sessions, provided by an educational team, are recommended as the best way to ensure knowledge translates into practice. This can be provided by Clinical Nurse Instructors.

The nursing management should:

1. Implement standardized nursing competencies throughout MNH and MOI to ensure a minimum level of skill throughout all nursing staff. This will ensure the nurses' knowledge is used appropriately in their practice.
2. Develop a policy that will foster capacity building in nurses caring for critically ill patients. It should include issues of periodic staff training and translation of research findings into practice. Strategic employment of nurses in the correct areas, with specific skills to care for critically ill patients, will ensure a high standard of patient care is provided to those who need it most.

Hospital Management is recommended to:

1. Be enlightened on the factors that make it difficult for nurses to use the GCS assessment, as this has an impact on patient outcomes. This includes addressing the main factor of nurses being over-worked due to a nursing shortage. If more skilled nurses were employed in critical care areas, then patients would have better monitoring of their GCS and more adequate care provided to them.
2. Formulate an educational team to assess, teach and ensure that nurses adhere to using the GCS correctly. This will help in improving the quality of care provided to the patients and could be provided by the Quality Nurses who are already working within the hospital.

Policy makers in teaching institutions are advised to:

1. Re-visit the nursing curriculum to ensure that adequate content on the use of GCS is included and that students are given ample opportunity to practice using the GCS.

Future research:

1. A study employing mixed methods involving more than two hospitals is recommended to gain more insight into the knowledge and practices of nurses related to GCS assessment. Methods of data collection should include document reviews and observation of practice. This will aid analysis of the actual knowledge gap, as well as the application of GCS, into practice.
2. An interventional study is recommended, to follow this study to assess the benefits of an implemented teaching program. Then, to assess if an increase in knowledge, leads to improved clinical practice.

The Researcher will:

1. Meet with nursing leaders and share with them the study results and assist them in implementing the above recommendations.
2. Present the results of this research at a hospital weekly meeting. This will be followed by a training at another weekly meeting.
3. Be available to assist in developing policies, guidelines, competencies and protocols to improve nurses' assessment skills when using the GCS.
4. Begin to influence practice in the current workplace, which is the national trauma hospital, by showing nurses how to assess the GCS correctly, observing and supporting their practice and listening to their suggestions.

6.3 Implications for Nursing practice.

The study provided an opportunity for the nurses to evaluate themselves in the area of knowledge relating to GCS assessment. Combined efforts between health care providers and the health institution's administration need to establish a team of nurses, working to induce change, with the aim of improving GCS assessment practices and knowledge and

ultimately, proper neurological assessment.

Lack of in service training noted by this study could be affecting the quality care of critically ill patients. Availability of enough equipment, guidelines and protocols that assist the critical care nurses in performing his/her GCS assessment activities effectively, should go hand to hand with the establishment and promotion of GCS assessment knowledge and practice in critical care settings of Muhimbili National Hospital and Muhimbili Orthopedic Institute, Dar es Salaam. Furthermore, the nurses from the Intensive Care Unit and the Emergency Medicine Department should be updated on a continuous basis about theoretical and clinical aspects of neurological assessments including GCS, as well as current research findings and new technologies in this field.

6.4 Limitations and mitigation of the study

Participant's time was limited in the sense that, some of them were less likely to respond to questionnaires because they felt overworked and did not have the time to complete the questionnaires. The researcher minimized this by formulating questions which were specific and most had closed ended answers.

The researcher spent a considerable amount of time observing the application of knowledge into practice, but was unable to quantify this data as the nurses needed a lot of prompting to follow the correct steps in their assessment of GCS. As this study clearly demonstrates there is a very low level of knowledge about the GCS, it can also be assumed that there is also a big practice deficit.

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Appendix A: Structured Questionnaire English version

Nurses’ knowledge and practice in the application of the Glasgow Coma Scale in the Intensive Care Unit and Emergency Department at Muhimbili National Hospital and Muhimbili Orthopedic Institute Dar es Salaam’’

Date.....

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Participants ID

INSTRUCTIONS:

- All information provided will be treated as confidential. Please do not write your name on this questionnaire
- Answer all questions according to your own opinion and experience as honestly as possible, and objectively.

SECTION A: NURSE FACTORS

Socio-Demographic Characteristics of Participants

This part enquires your personal particulars. You are asked to fill in or circle the answer that best describes your choice.

1. Age.....
2. Sex.....
 - (a) Male
 - (b) Female
3. Hospital.....
 - (a) Muhimbili National Hospital EMD
 - (c) Muhimbili National Hospital ICU
 - (b) Muhimbili Orthopaedic Institute EMD
 - (d) Muhimbili Orthopaedic Institute ICU

4. Current employment position.....
 - (a) Enrolled nurse
 - (b) Assistance nursing officer
 - (c) Nurse Officer
5. Highest level of education earned in nursing.....
 - (a) Certificate
 - (b) Diploma
 - (c) Bachelor degree
 - (d) Master's degree and above
6. Working experience in the Emergency medical department/ Intensive care unit
 - (a) 1-6 years
 - (b) 7-14 years
 - (c) 15 years and above.

SECTION B: KNOWLEDGE ABOUT THE GLASGOW COMA SCALE

7. Have you ever cared for a patient with altered level of consciousness who required assessment of GCS?
 - (a) Yes
 - (b) No
8. Have you had any recent training about GCS?
 - (a) Yes
 - (b) No
 - (c) I don't know
9. What is the function of GCS?
 - (a) Evaluate level of consciousness
 - (b) Evaluate cognitive changes
 - (c) Evaluate cognitive level of knowledge
10. Three components of GCS are:
 - (a) Eye opening, pupil reaction, and best motor response
 - (b) Eye opening, best verbal response, and motor deficit

- (c) Eye opening, best verbal response, and best motor response
11. Best score for the scale is:
- (a) 15
 - (b) 13
 - (c) 8
 - (d) 5
12. Worse score for the scale is:
- (a) 4
 - (b) 3
 - (c) 1
 - (d) 0
13. A GCS score that indicates a critical situation the examiner should be alert to is:
- (a) $GCS \leq 15$
 - (b) $GCS \leq 8$
 - (c) $GCS \leq 7$
 - (d) $GCS \leq 5$
14. When documenting GCS, the following criteria should be mentioned (select all which is applicable):
- (a) Presence of endotracheal intubation and eyelid edema
 - (b) Respiratory and hemodynamic stability
 - (c) Use of sedatives and neuromuscular blockage
15. GCS results can be divided into three categories – mild, moderate and severe. The results that indicate a moderate head injury are between:
- (a) 8-3
 - (b) 15-13
 - (c) 12-9
 - (d) 14-8
16. During the use of GCS, the most adequate response for the score is:
- (a) The first response presented by the patient
 - (b) The best response presented by the patient

(c) The last response presented by the patient

17. To assess eye opening, the examiner should begin with:

- (a) Verbally requesting the patient to open his/her eyes
- (b) Calling the patient's name out loud
- (c) Using painful stimuli
- (d) Standing next to the patient's bed

18. To assess the best verbal response, the examiner should begin with:

- (a) Making different questions
 - (b) Asking simple questions about location, time and self.
 - (c) Asking the patient about pain location

19. To assess the best motor response, the examiner should begin with:

- (a) A verbal command requesting a motor response
- (b) The use of painful stimulus
- (c) Observing muscle strength
- (d) Observing the range of movement

20. In GCS it is important to document:

- (a) Only the total score
- (b) Describing responses obtained
- (c) Scoring each indicator
- (d) Scoring each indicator, total score, and describe when necessary

SECTION C: FACTORS ASSOCIATED WITH APPLICATION OF GCS AMONG NURSES.

21. Do you think it is important to assess and record a GCS for every patient who has altered mental status?

- a) Strongly agree
- b) Agree
- c) Neither agree nor disagree
- d) Disagree
- e) Strongly disagree

22. Does your normal handover to other nurses include reporting the GCS?

- a) Yes
- b) No

23. Please list below patient conditions for which you would assess using GCS.

24. Please list ALL the factors which make it difficult for you to assess your patients by using GCS

THANK YOU FOR YOUR COOPERATION

Appendix B: Observation Check List

OBSERVATIONAL CHECKLIST FOR NURSES PRACTICE ON GCS

Code NO..... (To be filled by researcher).

	SKILLS TO BE OBSERVED	STEPS	PERFORMANCE		COMMENTS
			YES	NO	
1	Eye opening				
	Observe if patient opens eyes spontaneously	1			
	Calls and commands patient and observes if patient opens the eyes	2			
	Causes pain to the patient to see if eyes open with painful stimulus.	3			
	Acknowledges if no eye opening even after application of all previous described stimuli	4			
	TOTAL EYE OPENING				
2	Verbal response				
	Asks the patient to assess orientation to time, space and aware of the self	1			
	Able to test whether patient can answer questions, but incorrectly, as they are disoriented and confused	2			
	Identify inappropriate responses from patients	3			
	Able to detect incomprehensible speech from patients	4			
	Observe if there is no verbalization of any type	5			
	TOTAL VERBAL				
3	Motor response				
	Observes if patient obeys a command for movement.	1			
	Observes if there is localization in response to pain stimulus.	2			
	Observe if patient is able to withdraw from pain	3			
	Observe abnormal movement (spastic) flexion, decorticate posture	4			
	Detection of extensor (rigid) response, decerebrate posture	5			
	Identify if no response even after application of all previous described stimuli.	6			
	TOTAL MOTOR				
GRAND TOTAL					

THANK YOU FOR YOUR PARTICIPATION

Appendix C: Dodoso la Swahili

Kuangalia wauguzi wanavyotumia kipimo cha kupima ufahamu katika wodi za wagonjwa mahututi na vitengo maalum vya dharura vya hospitali ya taifa Muhimbili na Taasisi ya Tiba ya Mifupa na Mishipa ya fahamu Muhimbili Dar es Salaam.

Tarehe.....

Nambari ya utambulisho wa mshiriki

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MAELEKEZO

- Taarifa utakazotoa zitahifadhiwa kwa usiri
- Tafadhali usiandike jina lako katika dodoso hili.
- Jibu maswali yote kwa uzoefu ,maoni ,uaminifu na malengo

SEHEMU A: VIASHIRIA KWA MUUGUZI

Taarifa binafsi za mshiriki

Unatakiwa kujaza taarifa zako binafsi. Jaza au weka tiki kwenye jibu linaloelekeza chaguo lako

1. Mwaka wa kuzaliwa.....

2. Jinsia.....

(a) Kiume

(b) Kike

3. Hospitali.....

(a) Hospitali ya Taifa Muhimbili kitengo cha dharura

(c) Hospitali ya Taifa Muhimbili kitengo cha wagonjwa mahututi

(b) Taasisi ya tiba ya mifupa Muhimbili kitengo cha dharura

(d) Taasisi ya tiba ya mifupa Muhimbili kitengo cha wagonjwa mahututi

4. Nafasi yako kazini kwa sasa.....

- (a) Muuguzi mwenye cheti
- (b) Afisa Muuguzi msaidizi
- (c) Afisa muuguzi

5. Kiwango chako cha juu cha elimu ya uuguzi ulichonacho

- (a) Cheti
- (b) Stashahada
- (c) Shahada ya Kwanza
- (d) Shahada uzamili na zaidi

6. Uzoefu wako katika wodi za wagonjwa mahututi/ huduma ya dharura.....

- (a) Mwaka 1 hadi miaka 6
- (b) Miaka 7 hadi miaka 14
- (c) Miaka 15 na zaidi

SEHEMU B: UELEWA KUHUSU KIPIMO CHA KUPIMA UFAHAMU (GCS)

7. Ulishawahi kumuhudumia mgonjwa aliyepoteza fahamu?

- (a) Ndiyo
- (b) Hapana

8. Je, unakifahamu kipimo kinachopima ufahamu kwa wagonjwa walio poteza fahamu yaani (GCS)?

- (a) Ndiyo
- (b) Hapana
- (c) Sikifahamu

9. Faida ya kipimo cha kupima ufahamu ni?

- a) Kuweza kutambua mgonjwa ana ufahamu kwa kiasi gani

- b) Kutambua mabadiliko katika ufikiri
- c) Kutambua mabadiliko katika kufikiri na kuelewa.

10. Kwa kutumia kipimo cha kupima ufahamu unaangalia vitu vitatu navyo ni:

- (a) Kufungua macho,kupepesa kope, kukunja na kukunjua miguu na mikono.
- (b) Kufungua macho, kufungua mdomo, kushindwa kukunja na kukunjua mikono na miguu
- (c)Kufungua macho, kufungua mdomo, kukunja na kukunjua mikono na miguu.

11. Alama za juu katika kipimo hiki ni:

- (a) 10
- (b) 15
- (c) 5
- (d) 8

12. Alama za chini katika kipimo hiki ni:

- (a) 3
- (b) 4
- (c) 1

13. Alama za chini katika kipimo hichi zitakazokuonyesha kuwa hali ya mgonjwa siyo nzuri na kuwa anahitaji uangalizi na umakini zaidi ni:

- (a) Kipimo cha kupima ufahamu majibu yakiwa ≤ 7
- (b) Kipimo cha kupima ufahamu majibu yakiwa ≤ 8
- (c) Kipimo cha kupima ufahamu majibu yakiwa ≤ 15
- (d) Kipimo cha kupima ufahamu majibu yahiwa ≤ 5

14. Ili kupata majibu yaliyo sahihi kwa kutumia kipomo cha kupima ufahamu,unahitaji kuangalia viashiria vifuatavyo: (Chagua majibu yote ambayo ni sahihi)

- (a) Kukiwa na mpira ulioingizwa kwenye njia ya kupitisha hewa kwa ajili ya kupeleka hewa kwenye mapafu na kuvimba macho

- (b) Mfumo wa usafirishaji wa hewa na vipimo muhimu.
- (c) Kutumia dawa za usingizi na viziba misuli

15. Kwa kutumia kipimo cha kupima ufahamu unaweza kupima aidha kama mgonjwa kapata madhara kiasi kidogo, kiasi kikubwa au kiasi kikubwa sana, Je ni wakati gani utasema madhara yaliyopo ni kiasi:

- (a) 8-3
- (b) 15-13
- (c) 12-9
- (d) 14-8

16. Wakati unatumia kipimo cha kupima ufahamu unategemea kuona matokeo gani:

- (a) Matokeo ya kwanza kwa kuwasiliana na mgonjwa.
- (b) Matokeo ya mdomo kutoka kwa mgonjwa
- (c) Matokeo ya mwisho kutoka kwa mgonjwa.

17. Ukitaka kujua mgonjwa anavvofungua macho, unayepima unatakiwa kufanya nini:

- (a) Kufungua mdomo kwa kuambiwa na kufungua macho
- (b) Kuita mgonjwa kwa kutumia jina lake na kwa sauti kubwa.
- (c) Kumuamsha mgonjwa kwa kumfinya
- (d) Kukaa karibu na kitanda cha mgonjwa.

18. Ukitaka kujua mgonjwa anavyofungua mdomo, unayepima unatakiwa kufanya nini:

- (a) Kutengeneza maswali tofauti
- (b) Kuuliza maswali marahisi kuhusu matamshi, muda, nafasi na yeye mwenyewe
- (c) Kuuliza mgonjwa ana maumivu sehemu gani.

19. Ili kujua mgonjwa anavyokunja na kukunjua miguu na mikono, unayepima unatakiwa kufanya nini:

- (a) Kutumia mdomo kuuliza kukunja mifuguu na mikono na kukunjua.
- (b) Kutumia kitu cha kuisimua.
- (c) Kuangalia misuli na nguvu.
- (d) Kuangalia uwezo wa kuzunguka.

20. Kwenye kutumia kipimo cha kupima ufahamu ni muhimu kuchukua maelezo gani:

- (a) Jumla ya alama zilizopatikana tuu
- (b) Kuelezea matokeo yaliyopatikana
- (c) Alama za kila kipengele.
- (d) Alama za kila kipengele, jumla ya alama, na kuelezea alama hizo inapohitajika.

**SEHEMU D: MAMBO AMBAYO YANAWEZA KUHUSISHWA NA
KUTOKUFUATA MTIRIRIKO SAHIHI WAKATI WA KUTUMIA KIPIMO
CHA KUPIMA UFAHAMU MIONGONI MWA WAUGUZI.**

21. Je, unafikiri ni muhimu kuchunguza na kurekodi kipimo cha kupima ufahamu kwa kila mgonjwa ambaye hali yake inabadilika badilika?

- (a) Nakubali kwa nguvu
- (b) Nakubali
- (c) Wala kukubaliana wala hawakubaliani
- (d) Sikubali
- (e) Sikubaliani kabisa

22. Je, makabidhiano yako ya kawaida kwa wauguzi wengine ni pamoja na kutoa taarifa kuhusu kipimo cha kupima ufahamu?

- (a) Ndiyo
- (b) Hapana

23. Taja aina ya magonjwa ambayo hutathiminiwa kwa kutumia kipimo cha kupima ufahamu

24. Tafadhali orodhesha mambo yote ambayo hufanya kuwa vigumu ka wewe kutathmini wagonjwa wako kwa kutumia kipimo cha kupima ufahamu

ASANTE KWA USHIRIKIANO WAKO.

Appendix D: Orodha ya uchunguzi

Orodha ya uchunguzi wa ujuzi kuhusu kipimo cha kupima ufahamu katika wodi za wagonjwa mahututi na vitengo maalum vya dharura vya hospitali ya taifa Muhimbili na Taasisi ya Tiba ya Mifupa na Mishipa ya fahamu Muhimbili Dar es Salaam.

Nambari ya utambulisho (Ijazazwe na mtafiti).

S/N	UJUZI UTAKAO CHUNGUZWA	ALAMA		MAONI
		HAT UA	NDIYO HAPA NA	
1	Ufunguzi wa jicho			
	Chunguza kama mgonjwa anafungua jicho kwa hiari	1		
	Mwite na umuamrishe mgonjwa wakati unachunguza kama mgonjwa atafungua macho	2		
	kufungua jicho kwa kutokana na kichocheo cha uchungu	3		
	Kukiri kutokufungua macho hata baada ya kutumia kichocheo cha uchungu	4		
	JUMLA YA ALAMA KWA UFUNGUZI WA JICHO			
2	Kujibu kwa kutumia mdomo			
	Uwezo wa kumpima mgonjwa kama anatambua wakati, mahali alipo, na uwezo wa kujitambua yeye mwenyewe	1		
	Uwezo wa kumpima mgonjwa kama anaweza kujibu maswali ,anajibu visivosawa, amepoteza muelekeo na amechanganyikiwa	2		
	Kutambua majibu yasio muwafaka kwa mgonjwa	3		
	Uwezo wa kugundua matamshi yasiyofahamika kutoka kwa mgonjwa	4		
	Kuchunguza kama mgonjwa hawezi kuongea chochote	5		
	JUMLA YA ALAMA KWA KUJIBU KWA KUTUMIA			

	MDOMO				
3	Uwezo wa mfumo wa fahamu kupokea taarifa				
	Kuchunguza kama mgonjwa anaweza kutii amri ya kucheza misuli	1			
	Kuchunguza ikiwa mgonjwa anaweza kukunja mkono umbali wa mwili wake kutokana na kichocheo uchungu.	2			
	Kuchunguza ikiwa mgonjwa anaweza kujiondoshwa kutokana na maumivu.	3			
	Kuchunguza mwendo usio wa kawaida wakati wa kukunjua viungo na kukakamaa kwa viungo	4			
	Kutambua kukakamaa kwa viungo wakati wa kuvinyoosha, unyooshaji wa miguu na mikono usio wa kawaida	5			
	Hakuna mawasiliano hata baada ya kutumia vichocheo vyote vya kushtua mawasiliano ya mwili .	6			
	JUMLA YA ALAMA KWA MFUMO WA FAHAMU WA KUPOKEA TAARIFA				
JUMLA KWA ALAMA ZOTE					

AHSANTE KWA KUSHIRIKI.

Appendix E: LETTER FOR ETHICAL CLEARANCE

**MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR OF POSTGRADUATE STUDIES**

P.O. Box 65001
DAR ES SALAAM
TANZANIA
Web: www.muhas.ac.tz



Tel G/Line: +255-22-2150302/6 Ext. 1015
Direct Line: +255-22-2151378
Telefax: +255-22-2150465
E-mail: dpgs@muhas.ac.tz

Ref. No. MU/PGS/SAEC/Vol. IX/77

3rd April, 2017

Jacqueline Joseph Kimboka
MSc. Critical Care and Trauma,
MUHAS.

**RE: APPROVAL OF ETHICAL CLEARANCE FOR A STUDY TITLED
"ASSESSMENT OF NURSES IN APPLICATION OF GLASGOW COMA SCALE
IN INTENSIVE CARE UNIT AND EMERGENCY MEDICAL DEPARTMENT
AT MUHIMBILI NATIONAL HOSPITAL AND MUHIMBILI ORTHOPAEDICS
INSTITUTE IN DAR ES SALAAM."**

Reference is made to the above heading.

I am pleased to inform you that, the Chairman has, on behalf of the Senate, approved ethical clearance for the above-mentioned study. Hence you may proceed with the planned study.

The ethical clearance is valid for one year only, from 4th April, 2017 to 3rd April, 2018. In case you do not complete data analysis and dissertation report writing by 3rd April 2018, you will have to apply for renewal of ethical clearance prior to the expiry date.


Prof. Andrea H. Pembe
DIRECTOR OF POSTGRADUATE STUDIES

cc: Director of Research and Publication
cc: Dean, School of Nursing

Appendix F: PERMISSION LETTER FROM MUHIMBILI NATIONAL HOSPITAL DAR ES SALAAM

MUHIMBILI NATIONAL HOSPITAL

Cables: "MUIIMBILI"
 Telephones: +255-22-2151367-9
 FAX: +255-22-2150534
 Web: www.mnh.or.tz



Postal Address:
 P.O. Box 65000
 DAR ES SALAAM
 Tanzania

In reply please quote:
 Ref: MNH/IRC/ Research/ 2017/ 031

Date: 10/04/2017

Jacqueline Joseph
 MUHAS.

RE: PERMISSION TO COLLECT DATA AT MNH NO: 2017/031

Name	Jacqueline Joseph
Title	Assessment of Nurses in Application of Glasgow Coma Scale in Intensive Care Unit and Emergency Department at Muhimbili National Hospital and Muhimbili Orthopaedic Institute, in Dar es Salaam.
Institution	MUHIAS
Supervisor	Anne H. Outwater
Period	10 th April, 2017 – 09 th September, 2017 6months

You have been permitted to collect data in respect to the undertaking of the above mentioned study.

Please ensure that you abide to the ethical principle and other conditions of yours approval.

Sincerely,

Dr. Faraja Chiwanga (MD, M. Med, Msc)
 Head, Teaching, Research and Consultancy Coordination Unit

cc: Incharge Intensive Care Unit
 ✓ Emergency Medicine Department (Block Manager)

Appendix G: PERMISSION LETTER FROM MUHIMBILI ORTHOPEDIC INSTITUTE



P.O. Box 65474; DAR ES SALAAM, TANZANIA, MUHIMBILI COMPLEX

Executive Director: +255-022-2153359

General lines: (255-022-215)296/2152937/2152938

FAX: +255-022-2151744

E-Mail: info@moi.ac.tz

Website: www.moi.ac.tz

OFFERING SERVICES IN ORTHOPAEDICS, NEUROSURGERY AND TRAUMATOLOGY

AB.145/292/01B/222

18th April, 2017

Director of Postgraduate Studies
MUHAS
P.O.Box 65001
Dar es Salaam

RE: APPROVAL FOR PERMISSION TO CONDUCT RESEARCH.

Reference is made to your letter dated 5th April, 2017 with reference NO: HD/MUH/T.307/2015 captioned the above subject matter.

I am pleased to officially inform you that, your request for Ms. Jackline Joseph Kimboka to conduct a research titled 'Assessment of Nurses in Application of Glasgow Coma Scale in Intensive Care unit and Emergency Department at MOI' has been approved. Therefore you're very kindly requested to inform her to start her study as requested.

It's my hope that you will extend enough cooperation regarding this matter.

With regards


Abdallah Mbuguni
For: Executive Director

Cc: Medical Director- MOI

All correspondences to be addressed to the Executive Director.

Appendix H: Informed Consent (English Version)

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES (MUHAS)



DIRECTORATE OF RESEARCH AND PUBLICATIONS

MUHAS INFORMED CONSENT.

ID NO...

Consent to participate in a research study

Greetings!

My name is Jacqueline Joseph Kimboka and I am a 2nd year Student pursuing a Master of Science in Nursing Critical care and Trauma at Muhimbili University of Health and Allied Sciences (MUHAS). I am conducting the research titled “**Assessment of nurses in Application of the Glasgow Coma Scale in the Intensive Care Unit and Emergency Medical Department at Muhimbili National Hospital and Muhimbili Orthopedic Institute Dar es Salaam**”.

Purpose of the Study

The study is conducted as partial fulfillment of the requirement for the degree of masters of critical care and trauma of MUHAS. This study aims to determine the level of knowledge and practice on application of the Glasgow Coma Scale for improving quality care during assessment of critically ill patients in ICU and EMD Muhimbili National Hospital and Muhimbili Orthopedic Institute, Dar es Salaam

What Participation Involves

If you agree to join the study, you will be interviewed in order to answer a series of questions in the questionnaire prepared for the study.

Confidentiality

All information recorded will be entered into computers with only the study identification number. However no participant's name will be published. We do not expect that any harm will come to you due to participating in this study, except giving your time for the filling up the questionnaire.

Risks

We do not expect any risk while participating in this study.

Rights to Withdraw and Alternatives

Taking part in this study is completely your choice. You are free to choose either to participate in this study or not. You can decide to stop participating in this study any time you wish, even if you have already given your consent. Refusal to participate or your withdrawal from the study will not involve penalty or loss of any benefits to which you are otherwise entitled

Benefits

If you agree to take part in this study there are no direct benefits that you will get but we believe the information you will provide will help in improving Nurse's Knowledge and Practice on Application of Glasgow Coma Scale while assessing critically ill

patients at Muhimbili National Hospital and Muhimbili Orthopaedic Institute, Dar es Salaam.

Compensation

There will be no compensation of any form for participation in this study

Who to contact:

In case of any questions about the study contact the principal investigator **Jacqueline Joseph Kimboka**, Muhimbili University of Health And Allied Sciences School of Nursing Po. Box. 65004, Dar es Salaam, through Mobile number 0714489180.

If you ever have questions about your rights as a participant, you may call Chairman of the Senate Research and Publications Committee Dr. Joyce Masalu P.O. Box 65001, Dar es Salaam. Tel 2150302-6 2152489

Do you agree?

Participant agrees..... Participant does not agree.....

I, _____ have read the content in this form. My questions have been answered. I agree to participate in this study

Signature of participant_____

Signature of principal investigator_____

Date of signed consent_____

Appendix I: Fomu ya Ridhaa (Swahili version)

CHUO KIKUU CHA AFYA NA SAYANSI SHIRIKISHI MUHIMBILI



KURUGENZI YA TAFITI NA UCHAPISHAJI.

FOMU YA RIDHAA.

Namba ya utambulisho:

Salamu!

Naitwa Jacqueline J. Kimboka, kwasasa ninafanya utafiti kuhusu utumiaji wa kipimo cha kupima ufahamu kwa wagonjwa walio poteza fahamu, utafiti huu unawahusu wauguzi wanaofanya kazi katika kitengo maalumu cha wagonjwa mahututi (wasiojiweza) na kitengo cha huduma ya kwanza na dharura katika Hospital ya Taifa Muhimbili na Tasisi ya Tiba ya Mifupa na Mishipa ya Fahamu Muhimbili Dar es Salaam, Tanzania.

Umuhimu wa utafiti.

Utafiti huu unafanyika katika kutimiza sehemu ya matakwa ya shahada ya uzamili ya wagonjwa mahututi (wasiojiweza) na waliopata majeraha ya Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili.

Utafiti huu unalenga kaangalia kiasi cha uelewa na namna ya kutumia uelewa huo kwa kutumia kipimo maalumu cha kuangalia kiasi cha ufahamu kwa ajili ya kusaidia kutoa huduma nzuri hasa wakati wa uchunguzi wa wagonjwa mahututi (wasiojiweza) na ambao wamepata majeraha na wamelazwa kitengo maalumu cha wagonjwa mahututi na kitengo cha huduma ya kwanza na dharura cha Hospital ya Taifa Muhimbili na Taasisi ya Tiba ya Mifupa ya Muhimbili.

Jinsi ya kushiriki.

Ukikubali kushiriki katika utafiti huu, utasailiwa ili kuweza kujibu maswali toka kwenye dodoso lililoandaliwa kwa ajili ya utafiti huu.

Usiri

Majibu yote yatakusanywa kutoka katika eneo la utafiti na yataingizwa kwenye compyuta kwa kutumia namba ya utambulisho tu. Hakuna jina la mshiriki litakalochapishwa. Hatutegemei kwamba kutakuwa na madhara yoyote kwa wewe kujiunga na utafiti huu isipokuwa kutumia muda wa kujitoa katika majadiliano.

Madhara.

Hatutegemei madhara yeyote kukutokea kwa kushiriki kwako katika utafiti huu.

Haki ya Kutoka na Mbadala

Kushiriki katika utafiti huu ni uchaguzi wako, na una uhuru wa kukubali au kukataa kushiriki katika utafiti huu. Pia unaweza kuacha kushiriki katika utafiti huu muda wowote utakapojisikia hivyo hata kama umeshakubali kushiriki. Kukataa kushiriki au kuacha kushiriki katika utafiti huu hakutakufanya upate adhabu au ukose kufaidika na yale unayostahili kupata.

Faida.

Ukikubali kushiriki katika utafiti huu hakuna faida ya moja kwa moja utakayo pata lakini tunaamini maelezo utakayoyotoa yatasaidia kupendekeza njia zinazofaa kuboresha

huduma ya wagonjwa na namna ya kutumia kipimo cha kuangalia kiasi cha ufahamu wakati wanawahudumia wagonjwa mahututi katika Hospitali ya Taifa Muhimbili na Taasisi ya Tiba ya Mifupa Muhimbili, Dar es Salaam.

Fidia

Hakuna fidia yoyote itakayotolewa katika utafiti huu, uko huru kushiriki au kutoshiriki katika utafiti huu. Pia unaweza kujitoa /kujiengua wakati wowote.

Nani wa kuwasiliana naye.

Kama utakuwa na swali lolote kuhusu utafiti huu unaweza kuwasiliana na mkuu wa utafiti huu **Jacqueline Joseph Kimboka** wa Shule ya Uuguzi Chuo Kikuu cha Afya ya Tiba ya Sayansi Muhimbili, S.L.P. 65004, Dar es Salaam. Na ukiwa na swali lolote kuhusu haki zako kama mshiriki, wasiliana nami kwa namba 0714489180 au Dr. Joyce Masalu ambaye ni Mwenyekiti wa Kamati ya Utafiti ya Chuo, S.L.P. BOX 65001, Dar es Salaam. Tel +255 222152489

Je unakubali?

Mshiriki kakubali.....Mshiriki hajakubali.....

Mimi, _____ nimesoma na nimeelewa maelezo ya fomu hii. Maswali yangu yote yamejibiwa na nakubali kushiriki katika utafiti huu.

Sahihi ya mshiriki _____

Sahihi ya mtafiti _____

Tarehe _____